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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/972,925	10/10/2001	Masaki Hiraga	13780	4631

7590 03/12/2004

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EXAMINER	
WALLACE, SCOTT A	

ART UNIT	PAPER NUMBER
2671	4

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Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 09/972,925	Applicant(s) HIRAGA, MASAKI
	Examiner Scott Wallace	Art Unit 2671

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on _____.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-33* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-33* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date *03 / 01/03/02*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.

2. Claims 1-33 are rejected under 35 U.S.C. 102(a) as being anticipated by Hiraga et al., JP No. 02001092991A.

3. As per claims 1, 23 and 30, Hiraga discloses an object encoding method (abstract) comprising: obtaining a description of a surface of an object (abstract); defining an origin on the surface (abstract); decomposing the surface into a plurality of independent shape components according to a distance from the origin to a point of the surface (abstract); and encoding the shape components (abstract).

4. As per claims 2 and 24, Hiraga discloses wherein the description takes a form of a polygon mesh (abstract), the origin is a predefined base vertex in the polygon mesh (abstract), and the distance is a graph distance from the base vertex to a vertex of the polygon mesh (abstract).

5. As per claim 3, Hiraga et al discloses wherein the shape components include a contour graph which is a set of edges that connect between vertices that have the same graph distance (claim 3).

6. As per claim 4, Hiraga et al discloses ensuring that the object has validity as a closed surface by applying an Euler equation to a contour node and a contour edge which are extracted from the contour graph (claim 4).

7. As per claim 5, Hiraga et al discloses wherein the base vertex is a plurality of base vertices and the graph distance of a specific vertex is defined as a minimum value of the graph distances from the plurality of base vertices to the specific vertex (claim 2).

8. As per claim 6, Hiraga et al discloses wherein the shape components include an annulus (claim 6).

9. As per claim 7, Hiraga et al discloses wherein the shape components include a two-dimensional cell (claim 6).

10. As per claim 8, Hiraga et al discloses wherein the annulus takes the form of a triangle strip (claim 7).

11. As per claim 9, Hiraga et al discloses wherein the two-dimensional cell takes the form of a triangle strip (claim 7).

12. As per claim 10, Hiraga et al discloses wherein the two-dimensional cell is an independent region, only one boundary of which connects between vertices with a graph distance m, where m is a natural number (claim 8).

13. As per claim 11, Hiraga et al discloses wherein the annulus is an independent region, one boundary of which connects between vertices with a graph distance m and another boundary of which connects between vertices with a graph distance m+1, where m is a natural number (claim 9).

14. As per claim 12, Hiraga et al discloses wherein shape components include global topological information of the object (claim 10).

15. As per claim 13, Hiraga et al discloses wherein the global topological information is specified by a structural graph obtained on a basis of the graph distance (claim 11).

16. As per claim 14, Hiraga et al discloses wherein the structural graph is a Reeb graph known in differential topology (claim 12).

17. As per claim 15, Hiraga et al discloses wherein said encoding the shape components includes encoding geometrical information of the object and encoding local topological information of the object (claims 13 and 14).

18. As per claim 16, Hiraga et al discloses wherein said encoding the local topological information includes a description indicating that the object is a non-manifold when a shape represented by the polygon mesh is a non-manifold (claim 14).

19. As per claim 17, Hiraga et al discloses wherein the description describes the number of sets of polygons around a vertex that characterizes the non-manifold (claim 15).

20. As per claim 18, Hiraga et al discloses wherein said encoding the geometrical information adapts to a local size of the polygon mesh (claim 16).

21. As per claim 19, Hiraga et al discloses wherein said encoding the geometrical information is performed through an entropy coding of a difference between a predicted value and a real value of the geometrical information to be encoded (claim 17).

22. As per claim 20, Hiraga et al discloses adjusting the difference to optimize the entropy coding (claim 18).

23. As per claim 21, Hiraga et al discloses wherein the adjusting includes: assigning an allowance range to the real value; detecting a reference value within the allowance range to minimize an amount of the encoded difference between the predicted value and the reference value; and replacing the difference between the predicted value and the real value by the difference between the predicted value and the reference value (claim 19).

24. As per claim 22, Hiraga et al discloses wherein the allowance range is defined by adapting to the size of the polygon mesh relating to the geometrical information to be encoded (claim 20).

25. As per claim 25, Hiraga et al discloses wherein the shape components include global topological information of the object (claim 24).

26. As per claim 26, Hiraga et al discloses wherein the unit which encodes the shape components includes a unit that encodes geometrical information of the object and a unit that encodes local topological information of the object (claims 13 and 14).

27. As per claims 27 and 31, Hiragaet al discloses obtaining an object; defining a function on a distance on a surface of the object; obtaining a structural graph of the object on a basis of a value of the function; and encoding the object in such a form that the structural graph is included (claim 27).

28. As per claim 28, Hiraga et al discloses wherein the object is represented as a polygon mesh and the function outputs a graph distance from a predefined base vertex in the polygon mesh to a vertex of the polygon mesh (claim 28).

29. As per claim 29, Hiraga et al discloses wherein the structural graph represents a critical point of the function as a node (claim 29).

30. As per claims 32 and 33, Hiraga et al discloses an obtaining unit which obtains encoded data of an object; an extracting unit which extracts a plurality of independent shape components from the

encoded data, wherein said plurality of independent shape components were encoded after being decomposed according to a distance from an origin of the surface, which is included in the encoded data, to a point of the surface of the object; a decoding unit which decodes each of the extracted shape components and reconstructs geometry and topology information of the object; and an output unit which outputs a decoded representation of the object (claim 26).

Any inquiry concerning this communication or earlier communications from the examiner should be directed to **Scott Wallace** whose telephone number is **703-605-5163**.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, **Mark Zimmerman**, can be reached at 703-305-9798.

Any response to this action should be mailed to:

Commissioner of Patents and Trademarks

Washington, D.C. 20231

or faxed to:

(703) 872-9314 (for Technology Center 2600 only)

Hand-delivered responses should be brought to Crystal Park II, 2121 Crystal Drive, Arlington, VA, Sixth Floor (Receptionist).

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the Technology Center 2600 Customer Service Office whose telephone number is (703) 306-0377.

MARK ZIMMERMAN
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 2600